



# Heat Shrink Tubing FP-301

Flexible Polyolefin

## Data Sheet

### Product Description

3M™ Heat Shrink Tubing FP-301 offers an outstanding balance of electrical, physical and chemical properties for a wide variety of industrial and military applications. Rated for 135°C continuous operation, all FP-301 Tubing is split resistant, mechanically tough, easily marked and resists cold flow.

FP-301 Tubing meets MIL-DTL-23053/5 Class 1 & 2 and AMS-3636, AMS-3637 requirements. It is UL Recognized and CSA Certified at 600 volts @ 125°C (UL File Nos. E-39100 and CSA No. 38227).

FP-301 Tubing is rated for continuous operation at -55°C (-67°F) to 135°C (275°F), and is designed to withstand elevated temperatures to 300°C (572°F) for short periods. Minimum shrink temperature for all FP-301 Tubing is 100°C (212°F).

### Applications

FP-301 Tubing is typically used as a shrink-fit electrical insulation over cable splices and terminations. It is also used for lightweight wire harness covering, wire marking, wire bundling, component packaging and fire-resistant covering.

**NOTE: Technical information provided consists of typical product data and should not be used for specification purposes. Unless otherwise noted, all tests are performed at room temperature.**

### Applicable Specification

MIL-DTL-23053/5, Class 1, 2; AMS-3636, AMS-3637; UL File E-39100; CSALR38227; ABS

### Typical Physical Properties

|                                                    |                                                                     |
|----------------------------------------------------|---------------------------------------------------------------------|
| <b>Tensile Strength</b>                            | 2400 psi                                                            |
| <b>Ultimate Elongation</b>                         | 400%                                                                |
| <b>Longitudinal Change</b>                         | ±5%                                                                 |
| <b>Secant modulus (2%)</b>                         | 13,000 PSI                                                          |
| <b>Specific Gravity</b>                            | 1.3 (Black)<br>.93 (Clear)                                          |
| <b>Heat Aging (336 hrs. @ 175°C)</b>               | Elongation 175%                                                     |
| <b>Heat Shock (4 hrs. @ 250°C)</b>                 | No dripping, flowing, cracking<br>passes mandrel wrap test          |
| <b>Low Temperature Flexibility (4 hrs @ -55°C)</b> | No Cracking                                                         |
| <b>Flammability</b>                                | Self-extinguish meets UL224 All-Tubing<br>Flame Test (Class 1 only) |

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**Typical Electrical Properties**

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|----------------------------|-------------------------|
| <b>Dielectric Strength</b> | 900 V/mil               |
| <b>Volume Resistivity</b>  | 10 <sup>15</sup> ohm-cm |

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**Typical Chemical Properties**

|                           |               |
|---------------------------|---------------|
| <b>Corrosive Effect</b>   | Non-corrosive |
| <b>Solvent Resistance</b> |               |
| Tensile Strength          | 1000 PSI      |
| Dielectric Strength       | 400 V/mil     |
| <b>Water Absorption</b>   | 0.2%          |
| <b>Fungus Resistance</b>  | Non-nutrient  |

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**Standard Sizes and Dimensions**

| <b>Ordering Size</b> | <b>Expanded I.D.<br/>(Minimum)<br/>in. (mm)</b> | <b>Recovered .I.D.<br/>(Maximum)<br/>in. (mm)</b> | <b>Recovered Wall<br/>Thickness<br/>(Nominal)<br/>in. (mm)</b> |
|----------------------|-------------------------------------------------|---------------------------------------------------|----------------------------------------------------------------|
| 3/64                 | .046 (1,17)                                     | 0.23 (0,58)                                       | .016 (0,41)                                                    |
| 3/16                 | .063 (1,60)                                     | .031 (0,79)                                       | .017 (0,43)                                                    |
| 3/32                 | .093 (2,36)                                     | .046 (1,17)                                       | .020 (0,51)                                                    |
| 1/8                  | .125 (3,18)                                     | .062 (1,57)                                       | .020 (0,51)                                                    |
| 3/16                 | .187 (4,75)                                     | .093 (2,36)                                       | .020 (0,51)                                                    |
| 1/4                  | .250 (6,35)                                     | .125 (3,18)                                       | .025 (0,64)                                                    |
| 3/8                  | .375 (9,53)                                     | .187 (4,75)                                       | .025 (0,64)                                                    |
| 1/2                  | .500 (12,70)                                    | .250 (6,35)                                       | .025 (0,64)                                                    |
| 3/4                  | .750 (19,05)                                    | .375 (9,53)                                       | .030 (0,76)                                                    |
| 1                    | 1,000 (25,40)                                   | .500 (12,70)                                      | .035 (0,89)                                                    |
| 1 1/2                | 1,500 (38,10)                                   | .750 (19,05)                                      | .040 (1,02)                                                    |
| 2                    | 2,000 (50,80)                                   | 1,000 (25,40)                                     | .045 (1,14)                                                    |
| 3                    | 3,000 (76,20)                                   | 1,500 (38,10)                                     | .050 (1,27)                                                    |
| 4                    | 4,000 (101,60)                                  | 2,000 (50,80)                                     | .055 (1,40)                                                    |

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**Shrink Ratio**

3M™ Heat Shrink Tubing FP-301 has a 2:1 shrink ratio. When freely recovered, the polyolefin tubing will shrink to 50% of its as-supplied internal diameter. The recovered wall thickness of the tubing is proportional to the degree of recovery.

High expansion-ratio FP-301 Tubing meeting MIL-DTL-23053/5 Class 1 requirements for overexpansion are available subject to factory quotation.

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**Standard Colors**

FP-301 Tubing, Class I (flame retardant) – black, white, red, blue, green (1/16”-1” green only) and yellow. FP-301, Class 2 (non-flame retardant)-clear. Other colors available subject to factory quotation.

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**Standard Packaging**

Four-foot lengths, large spools (21” diameter) and small spools (8 1/2” diameter).

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**Ordering Information**

Order FP-301 Tubing by product name, size equivalent to expanded inside diameter, package type and color. Always order the largest size that will shrink snugly over the item to be covered.

Example: FP-301 Tubing, 1/4”, 4 ft., white.